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Individual Variation in *Furnarius leucopus torridus* (Furnariidae, Aves)

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ABSTRACT

The individuals of *Furnarius leucopus torridus* that have been collected in the upper Amazon Basin, from the upper Solimões westward into Amazonian Peru, differ conspicuously in the saturation of their plumage, and to a lesser extent in other characters. Some specimens are very dark, others are much paler. The variation appears to be merely individual and was first discussed by Hellmayr (1925) who called attention to the existence of intermediate specimens, but Zimmer (1936), working with different and less representative material, came to the conclusion that two distinct species were involved. The present paper reinvestigates this question and supports the opinion of Hellmayr. The material seen by Zimmer and most of the important specimens of Hellmayr were combined for this study, in addition to material of recent origin not seen by Zimmer or Hellmayr.

INTRODUCTION

Furnarius leucopus is very widely distributed in South America from northern Colombia, western Venezuela, and Guyana, south to northwestern and Amazonian Peru, Bolivia, central and northeastern Brazil. Its range is well interrupted in some regions and its populations vary geographically. The purpose of the present paper is to discuss the individual variation within some of the populations of the Amazon Basin, not the geographical variation of the species.

Furnarius leucopus varies individually throughout its range, a tendency better marked in some regions than others but which reaches a climax

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along the upper Amazon and some of its tributaries and has led to the erroneous belief that the variants from this region represent two distinct species, an opinion advanced by Zimmer (1936).

Available records suggest that strongly differentiated individuals first appear on the Amazon (or upper Solimões) in the region of Tonantins, or roughly longitude $67^{\circ} 45' W$, and can be traced westward into Amazonian Peru (fig. 3) to the junction of the Rio Napo and Rio Curaray, the lower Marañon to roughly its junction with the Huallaga where they occur on the latter at Santa Cruz, and on the lower Ucayali south to Sarayacu. However, as individuals that are distinctly intermediate occur also at Manu on the upper Rio Madre de Dios, individual variation may be pronounced throughout virtually all of Amazonian Peru.

The individual variants differ chiefly in the saturation of their plumage; some are very dark, amber-brown or chestnut, and suffused to a varying degree below with brownish ocher on the sides of the lower neck, on the breast, upper abdomen, and flanks, whereas other individuals are much paler above and below, chiefly dark raw sienna above, with a distinct orange tinge, and pale ochraceous below, tawny, rather than brownish, on the sides of the lower neck, breast, upper abdomen, and flanks. Differences exist also in the size of the bill and feet, but they are not constant, as many specimens are intermediate. In the dark variant, the bill averages slightly longer (table 1) and is in most cases somewhat coarser, the feet tending to be heavier as a rule, although no difference seems to exist in the measurements of the tarsus.

The dark variant was the first to be described by Sclater and Salvin (1866) who named it *torridus*, basing it on two specimens taken, respectively, on the lower and upper Ucayali River. The localities at which these two specimens were collected were not specified, but according to Sclater and Salvin (1866) the bird taken on the upper Ucayali was not collected above Cashiboya, which is situated a little above Contamana. The specimen from the lower Ucayali was selected as the type, according to Sclater (1890), and came from a locality below Sarayacu. The pale variant was described two years later and named *tricolor* by Giebel and was based, apparently, on a single specimen from Bolivia, taken at Santa Cruz de la Sierra according to Hellmayr (1925). In 1918, the pale variant was redescribed, this time from Pebas, Peru, by Chubb who named it *hauxwelli*. The oldest name is therefore *torridus*, with *tricolor* and *hauxwelli* as synonyms, but to simplify discussion and facilitate reference, the names *torridus* and *tricolor* are often used below for descriptive purposes, for, respectively, the dark and pale variants.

Hellmayr (1925) discussed the two forms and found that they vary

individually and are connected by intermediate specimens. He concluded that "The two 'phases' being connected by intermediates, are, I have no doubt, merely the extremes of individual variation." Hellmayr's conclusion is confirmed by my study, but Zimmer (1936) decided that the dark individuals represented a distinct species (*F. torridus*), the pale individuals (*tricolor*) being a subspecies of a second species (*F. leucopus*).

The material Zimmer examined was comparable in quantity (57 specimens) to the specimens seen by Hellmayr (58), but much less representative, as it included only one bird that is distinctly intermediate in coloration but which Zimmer did not so identify, and did not contain any specimen from Bolivia (the type locality of *tricolor*) or the types of the forms concerned (*torridus*, *tricolor*, and *hauxwelli*). These three types were examined by Hellmayr, and his opinion of *tricolor* was supported also by a series from central Bolivia in the Carnegie Museum which had been lent to Hellmayr by W. E. Clyde Todd. My opinion is based on all of Zimmer's specimens, most of the important birds mentioned by Hellmayr, including the types of *torridus* and *hauxwelli*, the series from Bolivia in the Carnegie Museum, as well as about 100 additional skins collected in Peru, Bolivia, and Brazil, almost entirely after the studies of Hellmayr and Zimmer, up to 1972, a total of 177 specimens. The only important specimen I have not seen is the type of *tricolor* which Hellmayr had examined in the Halle Museum in Germany. To compensate for this, however, I have seen 22 skins from Bolivia, including topotypes of *tricolor*.

The reasons advanced by Zimmer for not considering the two forms as variants but distinct species are: the difference in coloration mentioned above; "a rather definite difference in certain measurements which is significant" as it results in a proportionately shorter tail in *torridus*; "the plumage of *torridus* is coarser, and the legs and feet are heavier though not longer"; and a difference in the immature plumage, speckled on the breast in "young" *torridus*, but not in *tricolor*.

The dark variant (*torridus*) is very heavily saturated, whereas the pale variant (*tricolor*) is not. Zimmer enlarged on this by mentioning differences in the coloration of the superciliary streak; malar region, sides of the neck, and upper breast which outline the white throat more sharply in *torridus*; in the coloration of the auriculars and under tail coverts; and in the coloration of the rufous tips of the inner primaries which are less prominently contrasted in *torridus*. All the differences mentioned by Zimmer exist, but "are almost entirely of degree," according to Zimmer. To me, however, all the differences are relative, entirely in degree, and are connected by individuals that are more or less intermediate in one respect or another.

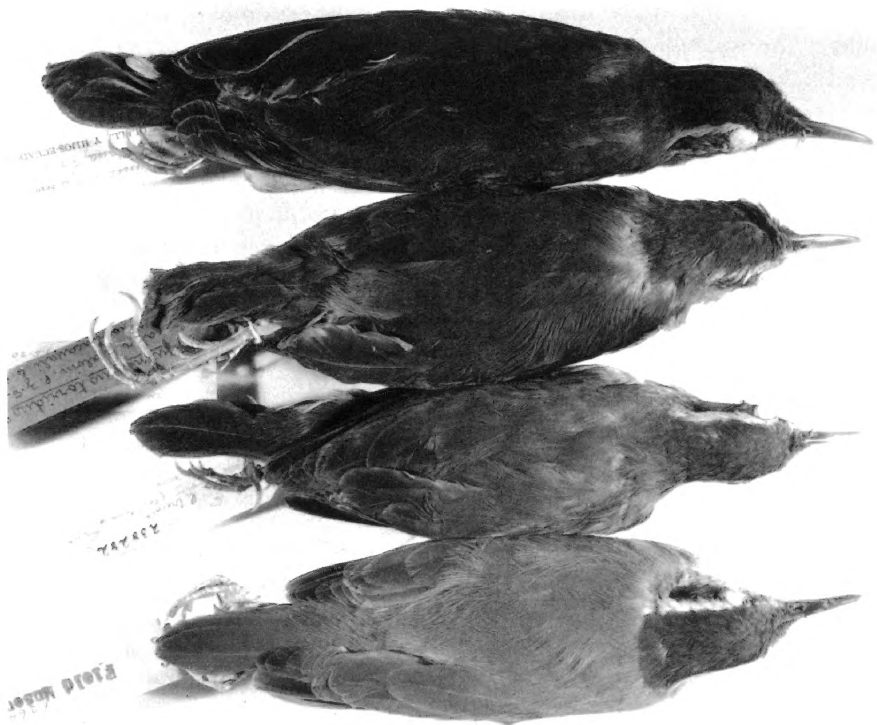


FIG. 1. Variation in degree of saturation in pigmentation of upper parts in *Furnarius leucopus torridus* (see discussion in text).

The variation in the degree of saturation of the upper parts is shown in figures 1 and 2. The specimen at the top of figure 1 is from Zimmer's series taken at Puerto Indiana in Peru which I selected as the darkest individual I have seen. The paler specimen below the bird from Puerto Indiana is the type of *torridus*, and the specimen below the type is one from Sarayacu which Zimmer identified as *tricolor*, but which is roughly intermediate in saturation between the type of *torridus* and a topotype of *tricolor* from Santa Cruz at the bottom of figure 1. Zimmer wrote on the label of the bird from Sarayacu that it was the "dark extreme" in his series of *tricolor* but he did not identify it as intermediate.

The type of *torridus* is not only paler than the very dark bird from Puerto Indiana, but brighter throughout, more amber, less dull dark chestnut. It is much older than the specimen from Puerto Indiana as it was collected in 1865, as against 1926 for the specimen from Puerto Indiana, but its

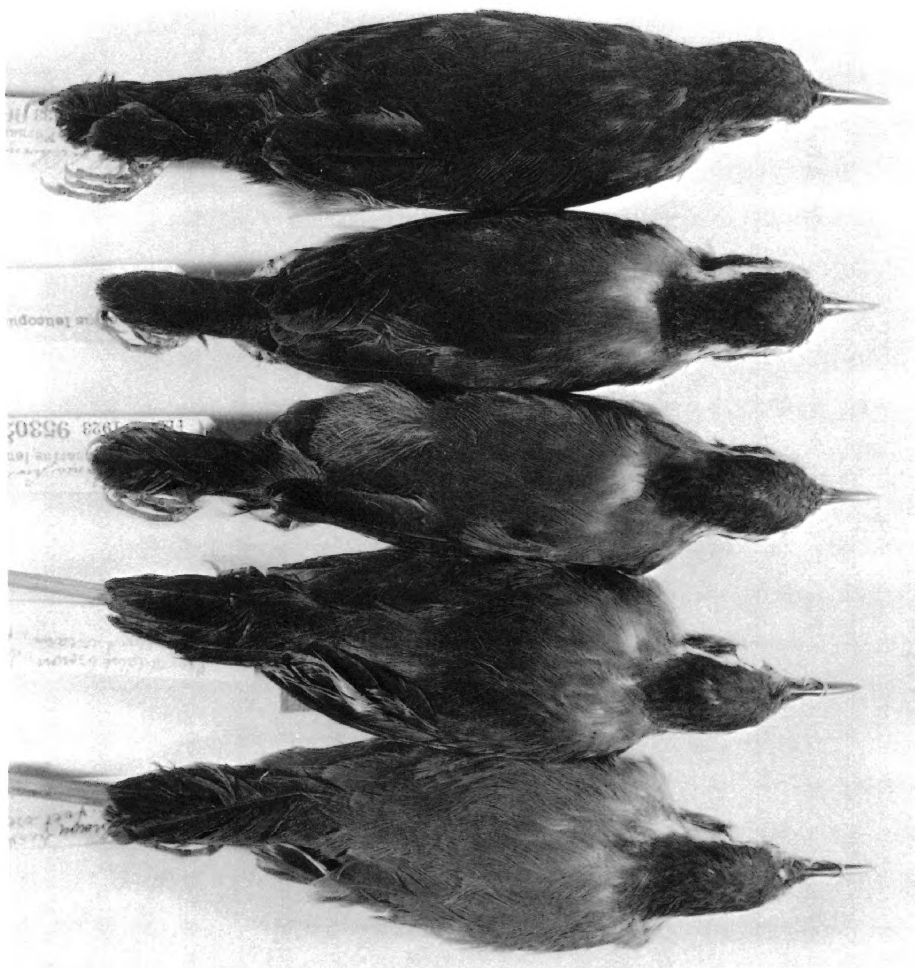


FIG. 2. Variation in degree of saturation in pigmentation of upper parts of *Furnarius leucopus torridus* from two localities (see text).

paler and brighter coloration does not seem to have been caused by age, or appreciably so, as this difference is shown by specimens collected in 1923, and the paratype of *torridus* (collected in 1865 also) is darker, duller, less amber than the type.

The variation in coloration of the under parts is not illustrated, but a series of specimens can be assembled that shows about the same gradation on the upper parts of the four birds in figure 1.

Figure 2 illustrates five specimens from two localities varying in the

TABLE 1
DARK AND PALE VARIANTS OF *Furnarius leucopus torridus*^a
(Measurements in millimeters, proportions, wing/tail index, in percent)

Variant or Population	Wing Mean	Wing Range	Tail Mean	Tail Range	Bill ^b Mean	Bill ^b Range	W/T Index
Dark Variant ^c							
14 ♂	95.71	88-102	55.64	51-62	26.86	26-28	57
6 ♀	92.30	89-96	54.50	53-57	26.08	26-26.5	59
Pale Variant							
6 ♂	89.67	87-93	54.17	52-58	25.0	24-26	60
6 ♀	86.92	84-90	52.50	49-57	24.59	22.5-27	60
Bolivia							
7 ♂	94.58	91-98	54.14	53-56	25.30	24-26.5	57
7 ♀	91.58	90-96	54.20	50-57	25.43	24-26.5	59
Rio Jurua							
4 ♂ ^d	93.50	88-97	53.0	51-56	24.67	24-25.5	57
6 ♀	90.0	87-92	54.16	51-56.5	25.50	24-27	59
Rio Purus ^e							
13 ♂	89.54	85-94	54.58	52-59	25.46	23.5-28	61
14 ♀	87.57	84.5-91	52.46	50-56	25.12	23.5-27	60
Rio Madeira ^f							
14 ♂	89.50	87-93	53.35	50-57	25.46	23.5-27.5	59
13 ♀	85.77	83-90	51.80	48-54.5	25.11	23-27	60

^a From the upper Solimões and Peru; and of populations from central Bolivia, middle Rio Jurua, middle and lower Rio Purus, and lower Rio Madeira.

^b Measured from the skull.

^c The type of *torridus* is an unsexed adult of the dark variant; it measures: wing 95, tail 55, bill 26; wing/tail index 58.

^d Bill measurements of three males.

^e This series includes also three specimens from Codajas on the Amazon, and the tail measurements are those of 13 females.

^f This series includes one specimen from Itacoatiara on the Amazon.

degree of saturation. The three at the top were collected by S. M. Klages at São Paulo de Olivença on the Solimões from February 21 to March 27, 1923. They are from the Carnegie Museum collection and were identified as *torridus*, for the specimen at the top, and as *tricolor* for the other two, probably by Todd who reported these specimens in 1948. The two at the bottom of figure 2 were collected by C. Kalinowski at Manu on the upper Rio Madre de Dios, southeastern Peru, in December, 1963, and February, 1965. These and four other specimens taken at Manu at the same time are in the collection of the Muséum National d'Histoire Naturelle of Paris; all six were identified as *tricolor* but vary individually very distinctly.

Measurements and proportions given in table 1 show that the proportions of the dark variant (*torridus*) and topotypes of *tricolor* are identical, and that very probably virtually no difference exists in measurements as the differences between means vary only from 1.50 to 0.30 mm. The measurements of the type of *torridus*, an unsexed adult, fall also within the range of the individual variation of topotypical *tricolor*.

The measurements of the populations seem to vary more or less irregularly, however, and Zimmer was misled by having specimens only from Peru and the lower Rio Madeira where the wing averages shorter than in the dark variant, not from Bolivia where virtually no difference seems to exist in size between this population and the dark variant. The latter does not seem to occur in any part of Bolivia, or of Brazil, with the exception of the upper Solimões; in allocating specimens for comparing measurements from regions in which there are both variants (upper Solimões and Peru), all specimens darker than the bird from Sarayacu shown in figure 1 were allocated to the dark variant.

Zimmer stated that "the plumage of *torridus* is coarser, and the legs and feet are heavier though not longer," and, as I have stated above, the bill of the dark variant averages slightly longer (see table 1) and is usually somewhat coarser. However, differences in the legs, feet, and bill are not constant and no difference in the texture of the plumage is apparent to me. It is possible that the plumage becomes slightly coarser when most heavily pigmented, but I do not know how to verify this. I suspect that any demonstrable difference would be slight and one of degree, bridged by intermediate specimens.

The plumage sequence of *F. leucopus* is not known and the evidence furnished by two specimens of the dark variant which may not be fully adult is too ambiguous to be conclusive.¹ These two specimens have a few

¹ A few scattered notes on the immature plumage of some species of the Furnariidae have been published, but to the best of my knowledge no complete study of the plumage

ill-defined dusty specks on the breast, or their breast is mottled, whereas in specimens of the pale variant, which are unquestionably immature, the breast is not speckled or mottled. But, as the dark variants are probably more heavily pigmented in all plumages, I think it improbable that the difference noted is a species character.

The speckled bird mentioned by Zimmer is a male from the junction of the Curaray and Napo rivers, which, he said, was a "young bird," an assumption obtained, no doubt, from its pigmentation. The other bird was collected recently by A. M. Rea on the Marañon near the mouth of the Rio Napo; it bears a general resemblance to Zimmer's specimen, but is mottled rather than speckled on the breast, and was sexed as an immature male by Rea, no doubt on the basis that its skull "is almost entirely single above," as he wrote on the label.

However, these two birds are not truly immature, although they may represent a stage of plumage intermediate between that of the young and adult. Their bill is much too big, measuring 26 and 26.5 mm., similar in length to the bill of the adult (table 1), whereas the bill measures only 20–21.5 (20.84) in three males, and 19–22.5 (21.10) in five females and unsexed birds that are genuinely immature specimens of *tricolor*. The skull of the two birds appears to be well ossified, "hard" on palpation, not soft and yielding as in young birds. The shape of the primaries and rectrices of these two birds seems also to be similar to the shape of these feathers in adults, whereas the primaries are more rounded and blunt at the tip, and the rectrices are narrower with more acute tips, in incontrovertibly immature birds. To be sure, I have not seen really young specimens of the dark variant, but there is no reason to assume that the size of the bill or shape of the feathers differs conspicuously in the young when they do not in adults of the two variants.

LOCALITIES AND SPECIMENS EXAMINED

The localities from which I have examined specimens from the upper Solimões, Peru, and Bolivia are shown in figure 3, with the exception of the region in northern Bolivia near the junction of the Rio Madre de Dios and Rio Beni; localities from regions of Brazil where the dark variant is unknown are omitted. Localities shown include all those which, I believe, have been reported in the literature, with the exceptions of Tarapoto, and "headwaters of the Huallaga," mentioned for Peru by Hellmayr (1925);

sequence for any member of the family. It is known, however, that the immature plumage can vary conspicuously in some species, which renders the interpretation of differences difficult in birds that have not fully assumed the adult plumage.

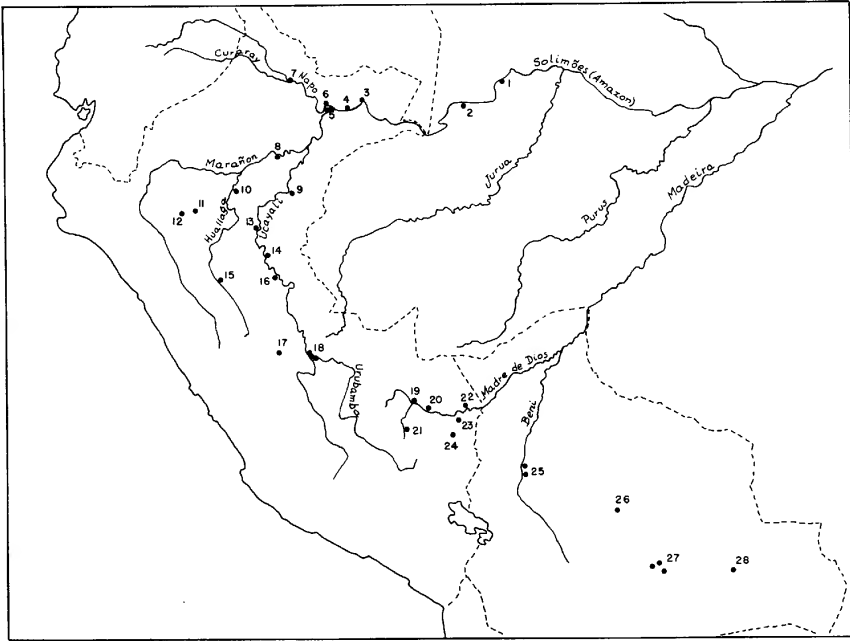


FIG. 3. Distribution of *Furnarius leucopus torridus* on upper Solimões, in Peru, and in central Bolivia (see text for names of localities).

Tarapoto is situated southeast of Moyobamba. "Anayacu," which is mentioned by Zimmer (1936) is an error for Apayacu.

The number of specimens I have seen from each locality is mentioned with the name of the institution in which they exist, or specimens lent me by Rea. As in the case of the comparison of measurements, all specimens darker than the bird from Sarayacu shown in figure 1 are identified as the dark variant (*torridus*); the others are the pale variant (*tricolor*). The names of the institutions to which the specimens belong are abbreviated as follows:

ANS, Academy of Natural Sciences
 AMNH, the American Museum of Natural History
 BM, British Museum (Natural History), Tring (formerly London)
 CM, Carnegie Museum
 FM, Field Museum of Natural History
 PM, Muséum National d'Histoire Naturelle, Paris
 SM, Naturhistoriska Riksmuseet, Stockholm

1. Panelas Island, Brazil: 1 *torridus*, 2 *tricolor*, CM
2. São Paulo de Olivença, Brazil: 4 *torridus*, 4 *tricolor*, CM

3. Pebas, Peru: 1 *torridus*, 1 *tricolor*, PM; 1 *tricolor*, AMNH; 1 *tricolor* (the type of *hauxwelli*), BM
4. Apayacu, and Oroza Island, Peru: 1 *torridus* (Apayacu), 1 *tricolor* (Oroza Island), AMNH
5. Yanamono, and Puerto Indiana, Peru: 1 *torridus*, 2 *tricolor* (Yanamono), lent by A. M. Rea; 1 *torridus* (Apayacu), AMNH
6. Rio Napo, 40 miles east of Iquitos, Peru: 5 *tricolor*, FM
7. Junction of Rio Napo and Rio Curaray, Peru: 8 *torridus*, AMNH
8. Elvira, Peru: 1 *tricolor*, BM
9. Lower Ucayali River, Peru: 1 *torridus* (the type of *torridus*), BM
10. Santa Cruz, Peru: 1 *torridus*, BM
11. Moyobamba, Peru: 2 *tricolor*, FM
12. Rio Seco, about 30 miles west of Moyobamba, Peru: 4 *tricolor*, AMNH
13. Sarayacu, Peru: 2 *torridus*, 5 *tricolor*, AMNH; 1 *tricolor*, PM
14. Upper Ucayali River, Peru: 1 *torridus*, BM
15. Tocache, Peru: 1 *tricolor*, PM
16. Yarinacocha, Peru: 7 *tricolor*, FM
17. Puerto Yessup, Peru: 2 *tricolor*, FM
18. Lagarto, Santa Rosa, and mouth of the Urubamba River, Peru: 5 *tricolor*, AMNH
19. Manu, Peru: 6 *tricolor*, PM
20. Mouth of the Rio Colorado, Peru: 1 *tricolor*, FM
21. Hacienda Villa Carmen, Peru: 3 *tricolor*, FM
22. Mouth of the Rio Piedras, Peru: 3 *tricolor*, FM
23. Collpa, Peru: 1 *tricolor*, FM
24. Astillero, Peru: 2 *tricolor*, AMNH
25. Chatarona, and Puerto Salinas, Bolivia: 2 *tricolor* (Chatarona), ANS; 1 *tricolor* (Puerto Salinas), SM
26. Mouth of the Rio Chaparé, Bolivia: 1 *tricolor*, ANS
27. Santa Cruz (Buenavista, Sara, and Santa Cruz), Bolivia: 2 *tricolor*, FM; 1 *tricolor*, PM; 2 *tricolor*, CM
28. Palmarito, Santa Cruz, Bolivia: 6 *tricolor*, CM

In addition to the 98 specimens listed above, 79 more were examined that had been collected in northern Bolivia, and in Brazil on the Solimões below Panelas Island, Rio Jurua, Rio Purus, lower Rio Madeira, and Amazon east to about the border of Para.

ACKNOWLEDGMENTS

I borrowed more than two-thirds of the specimens used in the present study and I appreciate this help from the Academy of Natural Sciences, Philadelphia; British Museum (Natural History), the bird collection of which has now been removed to Tring; Carnegie Museum, Pittsburgh; Field Museum of Natural History, Chicago; Muséum National d'Histoire Naturelle, Paris; Naturhistoriska Riksmuseet, Stockholm; and also from A. M. Rea who lent me three specimens he collected in January, 1972,

which were called to my attention by K. C. Parkes. I visited also the British Museum and the museums in Paris and Stockholm where I first saw the specimens and was cordially received. These three museums added to my debt further by sending me material, including types, for comparison with the specimens gathered in the United States. I am grateful for all this cooperation.

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